

CLAIMS

What is Claimed Is:

- 5 1. A method for blending images into a single image, comprising:
 selecting two images having overlapping content;
 dividing the two images into strips;
 selecting a strip in each of the two images where the two images
 overlap each other;
10 determining differences between the overlapping two strips;
 determining a line through the overlapping strips where the
 differences between the overlapping strips are minimized; and
 blending the two images together along the minimized line to create a
 single image.
- 15 2. The method according to claim 1, wherein the selected images belong
 to a set of two or more images comprising a scene.
- 20 3. The method according to claim 1, wherein the selected images differ
 from each other based on at least recording time, camera location, camera setting,
 lighting, shadows, and/or background.
- 25 4. The method according to claim 1, wherein each selected image is
 divided into at least one strip.
5. The method according to claim 1, wherein the selected images are
 divided along a common plane.

6. The method according to claim 1, wherein the selected images are divided into strips along one of a vertical plane or a horizontal plane.

7. The method according to claim 1, wherein the two overlapping strips
5 are selected according to a mean squared difference algorithm such that the sum of the mean squared difference values between the two selected strips is minimized.

8. The method according to claim 1, including:
cutting the selected images along the minimized line; and
10 joining the cut images together to create the single image of the scene.

9. The method according to claim 1, including:
calculating a squared color difference value for each pixel pair
15 between the overlapping strips;
converting the squared color difference values into a gray scale image of the overlapping strips, wherein the brightest pixels in the gray scale image correspond to the pixels of greatest difference between the two overlapping strips;
sorting the gray scale pixels from largest to smallest difference value;
20 for each sorted gray scale pixel, mapping the gray scale pixel to one of two regions within the overlapping strip according to the adjacency of the gray scale pixel to the one of the two regions;
determining a cut line between the two regions;
cutting each selected image along the cut line within the overlapping
25 strip of each selected image; and
combining the two cut selected images along the cut line to form the single image.

10. The method according to claim 9, wherein the cut line is determined between a first region and a second region to which the pixels have been mapped.

11. The method according to claim 9, wherein the cut line corresponds to
5 the line of best match between the overlapping strips.

12. The method according to claim 9, wherein at least one of the cut images is warped along the cut line to improve the fit between the two cut images along the cut line.
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13. The method according to claim 12, wherein a Gaussian function is used to warp the at least one cut image.

14. The method according to claim 1, wherein the blending of images is
15 performed iteratively, with the blended single image being utilized as one of the selected two images to be blended.

15. The method according to claim 14, wherein the method of blending is performed iteratively until all images comprising the scene have been blended into a
20 final single image of the scene.

16. A method for blending two images into a single image, comprising:
dividing two images into strips along a common plane;
selecting a strip in each image where the two images overlap;
25 determining a line through the overlapping strips where differences between the overlapping strips are minimized;
blending the two images along the determined minimized line to create a single image; and

warping the single image to minimize blurring along the blending line.

17. The method according to claim 16, wherein the minimized line is
5 determined by calculating mean squared difference values for pairs of pixels
between the two overlapping image strips.

18. The method according to claim 16, wherein at least one of the images
is warped where the differences between the selected strips along the blending line
10 exceed a predetermined threshold.

19. The method according to claim 16, wherein the single image is
warped by application of a Gaussian function.

20. The method according to claim 19, where the Gaussian function is
15 applied iteratively along a plurality of planes and with a plurality of magnitudes of
warp to determine the best fit between the images.

21. A computer-based system for blending images into a single image,
20 comprising:

a computer configured to:

divide two images having overlapping content into strips;

select a strip in each of the two images where the two images
overlap each other;

25 determine pixel difference values between the overlapping
two strips;

determine a line through the overlapping strips where the sum
of the pixel difference values between the overlapping strips are minimized; and

blend the two images together along the minimized line to create a single image.

22. The system according to claim 21, wherein the two overlapping strips
5 are selected according to a mean squared difference algorithm such that the sum of the mean squared difference values between the two strips is minimized.

23. The system according to claim 21, wherein the computer is
configured to:
10 calculate a squared color difference value for each pixel pair between the overlapping strips;
convert the squared color difference values into a gray scale image of the overlapping strips, wherein the brightest pixels in the gray scale image correspond to the pixels of greatest difference between the two overlapping strips;
15 sort the gray scale pixels from largest to smallest difference value;
for each sorted gray scale pixel, map the gray scale pixel to one of two regions within the overlapping strip according to the adjacency of the sort gray scale pixel to the one of the two regions;
determine a cut line between the two regions;
20 cut each image along the cut line of the overlapping strip of each image; and
combine the two cut images along the cut line to form the single image.

24. The system according to claim 23, wherein the cut line is determined
25 by calculating mean squared difference values for pairs of pixels between the two selected image strips.

25. The system according to claim 23, wherein at least one of the images is warped where the differences between the selected strips along the cut line exceed a predetermined threshold.

5 26. A system for blending images into a single image, comprising:
 means for dividing two images having overlapping content into strips
 in at least one region of overlap;
 means for calculating difference values between the pixels of the two
 images in the at least one region of overlap;
10 means for determining a cut line through the two images where the
 difference values are minimized; and
 means for blending the two images along the cut line to create a
 blended single image.

15 27. A system for blending images into a single image, comprising:
 a first computing module dividing two images having overlapping
 content into strips in at least one region of overlap;
 a second computing module calculating difference values between the
 pixels of the two images in the at least one region of overlap;
20 a third computing module determining a cut line through the two
 images where the difference values are minimized; and
 a fourth computing module blending the two images along the cut
 line to create a blended single image.

25 28. The system according to claim 27, including selecting two
 overlapping strips according to a mean squared difference algorithm such that the
 sum of the mean squared difference values between the two strips is minimized.

29. The system according to claim 27, including:

a fifth computing module cutting the two images along the cut line;
and

a sixth computing module joining the cut images together to create
the single image.

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30. The system according to claim 29, wherein at least one of the cut
images is warped along the cut line to improve the fit between the two images along
the cut line.

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31. The system according to claim 27, wherein the blending of images is
performed iteratively, with the blended single image being utilized as one of the two
images to be blended.

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32. The system according to claim 27, wherein the system is included in
one of a video camera or a digital camera.

33. A computer readable medium encoded with software for blending
images into a single image, wherein the software is provided for:

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selecting two images having overlapping content;
dividing the two images into strips where the two images overlap
each other;

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selecting a strip in each of the two images;
determining the differences between the overlapping two strips;
determining a line through the overlapping strips where the
differences between the overlapping strips are minimized; and
blending the two images together along the minimized line to create a
single image.

34. The software according to claim 33, wherein the selected images differ from each other based on at least recording time, camera location, camera setting, lighting, shadows, and/or background.

5 35. The software according to claim 33, wherein the two overlapping strips are selected according to a mean squared difference algorithm such that the sum of the mean squared difference values between the two strips is minimized.

10 36. The software according to claim 33, wherein the software is provided for:

calculating a difference value for each pixel pair between the two overlapping strips;

converting the calculated difference values into a gray scale image of the overlapping strips, wherein the brightest pixels in the gray scale image

15 correspond to the pixels of greatest difference between the two overlapping strips;

sorting the gray scale pixels from largest to smallest difference value;

for each sorted gray scale pixel, mapping the gray scale pixel to a first region or a second region within the overlapping strip according to the adjacency of the gray scale pixel to the first region or the second region;

20 determining a cut line within the overlapping strips between the first mapped region and the second mapped region;

cutting each selected image along the cut line of the overlapping strip of each selected image; and

25 combining the two cut selected images along the cut line to form the single image.